

# PATENT ABSTRACTS OF JAPAN

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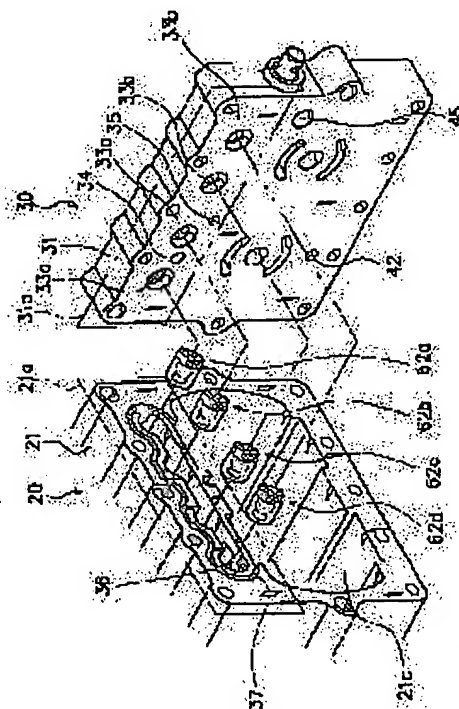
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## (54) PUMP UNIT

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a pump unit capable of reducing a cost and capable of improving assembling efficiency in the pump unit having a charge mechanism for replenishing pressure oil.

**SOLUTION:** This pump unit having a pump case for housing a hydraulic pump and a center section connected so as to block up an opening of the pump case, has a first oil feeding valve for allowing the inflow of oil to a pair of suction/delivery passages from a first charge oil passage and preventing the outflow of inverse directional oil, and is constituted so that the first oil feeding valve can be installed from an abutting surface of the center section or an abutting surface with the center section in the pump case.



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## CLAIMS

## [Claim(s)]

[Claim 1] So that the pump case which has opening which can insert in this hydraulic pump, and the aforementioned opening may be blockaded, while at least one hydraulic pump and this hydraulic pump are contained It is the pump unit equipped with the pin center, large section connected with a pump case. into the aforementioned pin center, large section Inhalation / regurgitation way of the couple in which the end section opens for free passage to each of the inhalation opening of the aforementioned hydraulic pump, and a delivery, and the other end carries out opening to the contact side with the aforementioned pump case in this pin center, large section, A hydraulic oil is supplied to the end section, and the 1st charge oilway the other end carries out [ the oilway ] opening to the contact side with the aforementioned pump case in this pin center, large section is formed. Into either [ at least ] the aforementioned pump case or a pin center, large section The free passage way which makes the other end of inhalation / regurgitation way of the aforementioned couple and the other end of the aforementioned charge oilway open for free passage is formed. this pump unit It has the 1st oil supply valve which permits an inflow of the oil to inhalation / regurgitation way of the aforementioned couple from the aforementioned 1st charge oilway, and prevents defluxion for the oil of an opposite direction. furthermore, the aforementioned 1st oil supply valve The pump unit characterized by being constituted so that it can install from the contact side of the aforementioned pin center, large section, or the contact side with the aforementioned pin center, large section in a pump case.

[Claim 2] The aforementioned pump case is a pump unit according to claim 1 characterized by being constituted so that an oil can be stored inside.

[Claim 3] The hydraulic oil supplied to the end section of the aforementioned charge oilway It is the regurgitation oil of the charge pump connected with the driving shaft which drives the aforementioned hydraulic pump in operation. into the aforementioned pin center, large section The 2nd charge oilway for opening the aforementioned interior of a pump case and the aforementioned 1st charge oilway for free passage is formed. this 2nd charge oilway The pump unit according to claim 2 which consists of an aforementioned 1st charge oilway so that it may permit that the reservoir oil in the aforementioned pump case flows the oil inside [ aforementioned ] a pump case into the aforementioned 1st charge oilway when inhalation / regurgitation way of the aforementioned couple become negative pressure, preventing flowing.

[Claim 4] The aforementioned free passage way is a pump unit given in either of the claims 1-3 characterized by being formed in the contact side with the aforementioned pin center, large section in the aforementioned pump case in the shape of a quirk, and forming in the contact side of this pump case leakage \*\*\*\*\* which is well-informed about the periphery of the free passage way of the shape of an aforementioned quirk in a pump case.

[Claim 5] A pump unit given in either of the claims 1-4 to which the bypass way which opens inhalation / regurgitation way of the aforementioned couple for free passage is formed in the aforementioned pin center, large section, and the opening-and-closing valve which opens for free passage / intercepts between inhalation / regurgitation way of the aforementioned couple is characterized by having operational from the exterior on this pie pass way.

[Claim 6] the 1st and 2nd hydraulic pumps each other arranged by the parallel status -- this -- the [ the 1st and ], while 2 hydraulic pumps are contained So that the pump case which has opening which can insert in this hydraulic pump, and the aforementioned opening may be blockaded It is the pump unit equipped with the pin center, large section connected with a pump case. into the aforementioned pin center, large section The 1st

inhalation / regurgitation way of the couple in which the end section opens for free passage to each of the inhalation opening of the 1st aforementioned hydraulic pump, and a delivery, and the other end carries out opening to the contact side with the aforementioned pump case in this pin center, large section,

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TECHNICAL FIELD

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[The technical field to which invention belongs] this invention relates to the pump unit equipped with the hydraulic pump, the pump case which holds this hydraulic pump, and the pin center, large section connected with this pump case.

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PRIOR ART

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[Description of the Prior Art] A hydraulic pump is used according to various intended use. Having two incomes with the actuator driven by operation of oil pressure is in this intended use. In this case, a hydraulic pump is connected with an actuator through the oil pressure line of a couple. And the aforementioned actuator drives by the pressure differential in the oil pressure line of the aforementioned couple produced according to the oil flow rate of a hydraulic pump. Thus, when being connected by the oil pressure line of a couple so that a hydraulic pump and an actuator may constitute a closed circuit, generally the charge device in which a pressure oil is supplied to the oil pressure line of the aforementioned couple is needed.

[0003] That is, the charge device equipped with the check valve which permits an inflow of the pressure oil to the charge line with which a pressure oil is supplied to the end section, and the other end is opened for free passage by the oil pressure line of the aforementioned couple, and the oil pressure line of this charge line to a couple, and prevents defluxion of the pressure oil to an opposite direction is needed.

[0004] cheap-izing of the manufacturing cost by lessening machining of a punch etc., when it has \*\* or a \*\* charge device -- and/or, although the enhancement in the assembly luminous efficacy containing an installation of a check valve was desired, the effective proposal from \*\* or \*\*\*\*\* was not made

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EFFECT OF THE INVENTION

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[Effect of the Invention] In the pump unit concerning this invention, since the check valve inserted in the line for pressure-oil supply to the oil pressure line of the couple which connects a hydraulic pump and an actuator was constituted so that it could install from one side of the contact side of a pin center, large section and a pump case, while the punch work in a pin center, large section can be reduced, the assembly luminous efficacy of a pump unit can be raised.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] It is the pump unit used for the bottom of having two incomes with the actuator which this invention is made in view of the aforementioned conventional technique, and is driven by operation of a pressure oil, and sets it as the purpose of 1 to offer the pump unit which can aim at cheap-izing of a cost, and enhancement in assembly luminous efficacy in the pump unit equipped with the charge device in which a pressure oil is supplied.

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## MEANS

[Means for Solving the Problem] In order to attain the aforementioned purpose, while this invention contains at least one hydraulic pump and this hydraulic pump So that the pump case which has opening which can insert in this hydraulic pump, and the aforementioned opening may be blockaded It is the pump unit equipped with the pin center, large section connected with a pump case. into the aforementioned pin center, large section Inhalation / regurgitation way of the couple in which the end section opens for free passage to each of the inhalation opening of the aforementioned hydraulic pump, and a delivery, and the other end carries out opening to the contact side with the aforementioned pump case in this pin center, large section, A hydraulic oil is supplied to the end section, and the 1st charge oilway the other end carries out [ the oilway ] opening to the contact side with the aforementioned pump case in this pin center, large section is formed. Into either [ at least ] the aforementioned pump case or a pin center, large section The free passage way which makes the other end of inhalation / regurgitation way of the aforementioned couple and the other end of the aforementioned charge oilway open for free passage is formed. this pump unit It has the 1st oil supply valve which permits an inflow of the oil to inhalation / regurgitation way of the aforementioned couple from the aforementioned 1st charge oilway, and prevents defluxion for the oil of an opposite direction. furthermore, the aforementioned 1st oil supply valve The pump unit constituted so that it can install from the contact side of the aforementioned pin center, large section or the contact side with the aforementioned pin center, large section in a pump case is offered.

[0007] Preferably, the aforementioned pump case shall be constituted so that an oil can be stored inside.

[0008] Moreover, the hydraulic oil supplied to the end section of the aforementioned charge oilway preferably It is the regurgitation oil of the charge pump connected with the driving shaft which drives the aforementioned hydraulic pump in operation. into the aforementioned pin center, large section The 2nd charge oilway for opening the aforementioned interior of a pump case and the aforementioned 1st charge oilway for free passage is formed. this 2nd charge oilway [0009] [ consisting of an aforementioned 1st charge oilway so that it may permit that the reservoir oil in the aforementioned pump case flows the oil inside / aforementioned / a pump case into the aforementioned 1st charge oilway when inhalation / regurgitation way of the aforementioned couple become negative pressure, preventing flowing ] Moreover, the aforementioned free passage way shall be formed in the contact side with the aforementioned pin center, large section in the aforementioned pump case in the shape of a quirk, and leakage \*\*\*\*\* which is well-informed about the periphery of the free passage way of the shape of an aforementioned quirk in a pump case shall be formed in the contact side of this pump case.

[0010] Moreover, the bypass way which opens inhalation / regurgitation way of the aforementioned couple for free passage shall be formed in the aforementioned pin center, large section, and this pie pass way shall be equipped with the opening-and-closing valve which opens for free passage / intercepts between inhalation / regurgitation way of the aforementioned couple operational from the exterior.

[0011] moreover, the 1st and 2nd hydraulic pumps each other arranged by the parallel status in order that this invention may attain the aforementioned purpose -- this -- the [ the 1st and ], while 2 hydraulic pumps are contained So that the pump case which has opening which can insert in this hydraulic pump, and the aforementioned opening may be blockaded It is the pump unit equipped with the pin center, large section connected with a pump case. into the aforementioned pin center, large section The 1st inhalation / regurgitation way of the couple in which the end section opens for free passage to each of the inhalation opening of the 1st aforementioned hydraulic pump, and a delivery, and the other end carries out opening to the contact side with the aforementioned pump case in this pin center, large section, The 2nd inhalation / regurgitation way of the

couple in which the end section opens for free passage to each of the inhalation opening of the 2nd aforementioned hydraulic pump, and a delivery, and the other end carries out opening to the contact side with the aforementioned pump case in this pin center, large section, A hydraulic oil is supplied to the end section, and the 1st charge oilway the other end carries out [ the oilway ] opening to the contact side in the aforementioned pin center, large section is formed. Into either [ at least ] the aforementioned pump case or a pin center, large section The free passage way which makes the other end of 2 regurgitation way and the other end of the aforementioned charge oilway open for free passage is formed. the [ the aforementioned 1st inhalation way and ] -- the [ 1 regurgitation way, the aforementioned 2nd inhalation way, and ] -- this pump unit It has the 1st oil supply valve which permits an inflow of the oil to the 1st inhalation / regurgitation way of the aforementioned couple, and the 2nd inhalation / regurgitation way of the aforementioned couple from the aforementioned 1st charge oilway. furthermore, the aforementioned 1st oil supply valve The pump unit constituted so that it can install from the contact side of the aforementioned pin center, large section or the contact side with the aforementioned pin center, large section in a pump case is offered.

[0012]

[Embodiments of the Invention] It explains, referring to an accompanying drawing below to gestalt 1. of operation about the gestalt of desirable operation of the 1st of the pump unit 1 concerning this invention. The pump unit 1 concerning this invention is connected through the oil pressure lines 130a and 130a (130b, 130b) of a couple, and has two incomes with the actuator driven by operation of the pressure oil in the oil pressure line of this couple. In the gestalt of this operation, the case where hydraulic motors 120a and 120b are used as the aforementioned actuator is explained to an example.

[0013] Drawing 1 is a hydraulic-circuit view of the vehicle with which the pump unit 1 concerning the gestalt of this operation was applied, and drawing 2 is a transection plan near [ aforementioned ] a pump unit. Moreover, drawing 3 is a solution perspective diagram a part, and the A-A line [ respectively in drawing 2 in drawing 4 - view 9 ], the B-B line, the C-C line, D-D lines, E-E lines and F-F line cross section of a pump unit, and the drawing 10 are G-G string cross sections in drawing 5.

[0014] it is shown in the drawing 1 and the drawing 2 -- as -- the aforementioned pump unit 1 -- the [ 1st hydraulic-pump 10a and ] -- 2 hydraulic-pump 10b -- this -- the [ the 1st and ] -- while the 2 hydraulic pumps 10a and 10b are contained, it has the pin center, large section 30 connected with a pump case 20 so that the pump case 20 which has opening which can insert each of this hydraulic pump in, and the aforementioned opening may be blockaded

[0015] In addition, in the gestalt of this operation, although the case where it has the hydraulic pump of a couple is explained to an example, this invention is not restricted to \*\* or \*\*\*\*\*, and when it has one hydraulic pump, or when it has three or more hydraulic pumps, it may be applied.

[0016] it is shown in drawing 1 -- as -- the [ the above 1st and ] -- the [ 1st hydraulic-motor 120a which the 2 hydraulic pumps 10a and 10b are used as the good change product type from which inhalation/flow rate changes by operation of a cam plate, and functions as the aforementioned actuator through the 1st oil pressure lines 130a and 130a of a couple, and 2nd oil pressure line 130b of a couple, respectively, and ] -- it connects with 2 hydraulic-motor 120b

[0017] Therefore, a pressure differential arises between 1st oil pressure line 130a of a couple, and 130a, and/or between 2nd oil pressure line 130b of a couple, and 130b by operating a cam plate and changing inhalation/flow rate of each hydraulic pump 10a and 10b. and the operation angle of a cam plate -- responding -- the [ 1st hydraulic-motor 120a and/or ] -- the motor shaft of 2 hydraulic-motor 120b rotates, and the drive-pulley rings 140a and 140b connected with this motor shaft in operation drive In addition, in drawing 1, a sign 100 is a driving source and a sign 110 is a cooling fan.

[0018] as mentioned above, the gestalt of this operation -- setting -- the [ the above 1st and ] -- the 2 hydraulic pumps 10a and 10b -- a good change product type -- carrying out -- this -- the [ the 1st and ] -- the [ the 1st which has two incomes with the 2 hydraulic pumps 10a and 10b, and ] -- although the 2 hydraulic motors 120a and 120b are made into the fixed positive-displacement design, this invention is not limited to \*\* or \*\*\*\*\* That is, it is also possible to be able to make a hydraulic pump into a fixed positive-displacement design, and to be also able to use as a good change product type the hydraulic motor driven with the aforementioned hydraulic pump, or to use the both sides of a hydraulic pump and a hydraulic motor as a good change product type.

[0019] it is shown in the drawing 2 and the drawing 4 -- as -- the [ the aforementioned 1st hydraulic-pump 10a

and ] -- 2 hydraulic-pump 10b the [ 1st pumping-axes 11a mutually arranged in parallel in the aforementioned pump case 20, respectively, and ] -- with 2 pumping-axes 11b the [ 1st piston unit 12a which performs reciprocating motion in connection with rotation of this pumping axes, and ] -- with 2 piston unit 12b the [ 1st cylinder block 13a which supports this piston unit free / reciprocation /, and ] -- with a tilt angle with 2 cylinder-block 13b the [ to which the stroke length of the aforementioned piston unit is regulated and inhalation / regurgitation oil quantity of this piston unit are changed ] -- the [ 1 movable cam-plate 14a and ] -- the [ 1st control-axis 15a which operates 2 movable cam-plate 14b and the tilt angle of this movable cam plate, and ] -- it has 2 control-axis 15b

[0020] as shown in drawing 4 , as for the aforementioned 1st control-axis 15a, an inner direction edge rushes in into a pump case 20 -- having -- arm 16a -- minding -- the -- it connects with 1 movable cam-plate 14a the [ and ] -- the way edge is prolonged to the way outside the pump case 20 toward the perpendicular direction upper part outside 1 control-axis 15a The same is said of 2nd control-axis 15b although not illustrated.

[0021] in addition, the gestalt of this operation -- setting -- a pump unit 1 -- the [ the 1st and ] -- that by which this invention is restricted to \*\* or \*\*\*\*\* although it considered as the level type (horizontal type) which is arranged and becomes so that the 2 pumping axes 11a and 11b might be prolonged horizontally -- it is not -- the [ the 1st and ] -- naturally it is also possible to consider as the vertical type (vertical type) to which the 2 pumping axes 11a and 11b extend perpendicularly

[0022] the aforementioned pump unit 1 -- further -- the [ 1st hydraulic-pump 10a and ] -- it has the center-valve-position return mechanism 50 which returns the cam plates 14a and 14b of 2 hydraulic-pump 10b to a center valve position, respectively The part plan of the aforementioned pump unit 1 is shown in drawing 11 . This center-valve-position return mechanism 50 is equipped with 1st center-valve-position return-mechanism 50a for 1st hydraulic-pump 10a, and 2nd center-valve-position return-mechanism 50b for 2nd hydraulic-pump 10b on common base-plate 50c attached in the top of a pump case 20. In the following explanations, although 1st center-valve-position return-mechanism 50a is explained, this explanation is similarly applied about 2nd center-valve-position return-mechanism 50b.

[0023] As shown in drawing 11 , the aforementioned 1st center-valve-position return-mechanism 50a Link arm 51a by which the end section was connected with the link member 150 connected with the control lever (not shown) free [ rotation ], and the other end was connected with control-axis 15a at the rotation impotentia, It has swinging arm 52a by which the base edge was connected with the aforementioned control-axis 15a at the relative rotation impotentia, and the point was used as the free end, and eccentric pin 53a fixed to the top of a pump case 20 free [ attachment and detachment ].

[0024] The nose of cam edge of the aforementioned swinging arm 52a is formed so that it may have invert-elevation 251a close to the axial center of the aforementioned control-axis 15a, and cam \*\*\*\* 252a prolonged from this invert elevation to both sides so that the distance from the axial center of the aforementioned control axis may become long gradually as it estranges from this invert elevation.

[0025] The aforementioned eccentric pin 53a has 1st shank 254a attached in the top of base-plate 50c, and 2nd shank 255a prolonged in the upper part from this 1st shank, and eccentricity of the axial center of this 2nd shank is carried out to the axial center of the 1st shank. If it follows and 1st shank 254a is rotated to the circumference of an axial center, the axial center of 2nd shank 255a will rotate to the circumference of the axial center of 1st shank 254a.

[0026] The aforementioned 1st center-valve-position return-mechanism 50a has push arm 54a by which the base edge was further supported free [ the rotation to 2nd shank 255a of the aforementioned eccentric pin 50a ], and the point was used as the free end. Rolling roller 55a which engages with the nose of cam edge of the aforementioned swinging arm 52a is prepared in this push arm 54a. When the cam plate of hydraulic-pump 10a is in a center valve position, push arm 54a and swinging arm 52a are arranged so that rolling roller 55a may engage with invert-elevation 251a of swinging arm 52a.

[0027] It is in the status which specifically set the cam plate of hydraulic-pump 10a as the position considered to be a center valve position, and push arm 54a is positioned so that rolling roller 55a may engage with invert-elevation 251a of swinging arm 52a. In this case, the case where hydraulic-pump 10a will not be in the neutral status may arise according to an assembly error etc. That is, if predetermined angle rotation of the swinging arm 52a is not carried out from the predetermined position on the design shown in drawing 11 to the circumference one side of an axial center of control-axis 15a, the case where a cam plate is not located in a center valve

position may arise.

[0028] To a \*\* or \*\* case, it sets at 1st center-valve-position return-mechanism 50a. Since eccentricity of the 2nd shank 255a of eccentric pin 53a used as the titubation supporting point of push arm 54a is carried out to 1st shank 254a, as mentioned above, by rotating 1st shank 254a to the circumference of an axial center The axial center position of 2nd shank 255a can be adjusted easily, therefore the relative position of rolling roller 55a to swinging arm 52a can be easily adjusted now. Thus, in this 1st center-valve-position return-mechanism 50a, if predetermined angle rotation of the swinging arm 52a is not carried out from the predetermined position on a design according to an assembly error etc. at the circumference of the axial center of control-axis 15a, even if it is the case where hydraulic-pump 10a will not be in the neutral status, it will become possible to make rolling roller 55a engage with invert-elevation 251a of swinging arm 52a of this status easily.

[0029] The aforementioned 1st center-valve-position return-mechanism 50a is further equipped with energization member 56a which turns the aforementioned rolling roller 55a to the nose of cam edge of the aforementioned swinging arm 52a, and energizes it.

[0030] 1st center-valve-position return-mechanism 50a equipped with \*\* or \*\*\*\*\* acts as follows. First, when an operator operates the control lever (not shown) which it had near the driver's seat, according to operation of this control lever, the aforementioned link member 150 slides along with one side of the orientation of the arrow head in drawing 11 . Thereby, a link arm carries out 51a titubation, and control-axis 15a rotates. Thus, a cam plate inclines according to operation of a control lever.

[0031] On the other hand, if operation of this control lever is canceled of the status that the operator made the cam plate incline by operation of a control lever, 1st center-valve-position return-mechanism 50a may have comes to return the cam plate of a hydraulic pump to a center valve position automatically. That is, when the cam plate inclines in the orientation of either from the center valve position, since axial rotation of the control-axis 15a is carried out from the center valve position at the circumference one side of an axial center, swinging arm 52a is rocked according to the angle of rotation of control-axis 15a to the circumference one side of an axial center of control-axis 15a. Therefore, the aforementioned rolling roller 55a is engaging with one side of cam \*\*\*\* 252a in the nose of cam edge of the aforementioned swinging arm 52a. Rolling roller 55a by energization member 56a As mentioned above, always, Since it is energized toward the nose of cam edge of swinging arm 52a, if operation of the aforementioned control lever is canceled in the status that rolling roller 55a is engaging with cam \*\*\*\* 252a Swinging arm 52a is \*\* made automatic by the cam operation between rolling roller 55a and cam \*\*\*\* 252a to the center valve position where rolling roller 55a engages with invert-elevation 251a.

[0032] Thus, according to the operation cancel to a control lever, the aforementioned 1st center-valve-position return-mechanism 50a acts so that the cam plate of hydraulic-pump 10a may be automatically returned to a center valve position.

[0033] the aforementioned pump unit 1 is further held in the aforementioned housing 20, as well shown in drawing 2 -- having -- the [ the above 1st and ] -- it has the power transmission device 50 which connects 2 hydraulic-pump shafts 11a and 11b in operation

[0034] having the aforementioned power transmission device 50 -- the [ a driving source 100, the 1st, or ] -- the 2 pumping axess 11a and 11b can only connect one side (it sets in the gestalt of this operation and is 1st pumping-axes 11a) either, both pumping axess 11a and 11b can be made to be able to drive simultaneously, and, thereby, the transmission structure to this pump unit 1 can be made to simplify from a driving source 100

[0035] In the gestalt of this operation, the gearing gear which comes to have 2nd gearing 50b which is supported by 1st gearing 50a supported by 1st pumping-axes 11a at the relative rotation impotentia and the aforementioned 2nd pumping-axes 11b at the relative rotation impotentia, and gears with the aforementioned 1st gearing 50a as the aforementioned power transmission device 50 is used. In addition, it is also possible to replace with this gearing gear and to use proper power transmission devices, such as a chain and a belt.

[0036] the aforementioned pump case 20 -- the aforementioned pin center, large section 30 -- liquid -- it is blockaded densely and an oil can be stored now inside That is, a pump case 20 functions also as a part of reservoir tank. In addition, the sign 45 in the drawing 3 and the drawing 6 is a run through-hole which makes the inside of this oil tank and a pump case open for free passage, when it has an oil tank separately.

[0037] this pump case 20 is shown in drawing 2 -- as -- the [ the 1st and ] -- it has the 1st pump case 21 which holds the 2 hydraulic pumps 10a and 10b, and the 2nd pump case 22 which holds the aforementioned power transmission device 50

[0038] As the 1st aforementioned pump case 21 is well shown in the drawing 2 and the drawing 4 Longitudinal direction one side of the aforementioned pumping axes 11a and 11b (in the gestalt of this operation, it is a vehicle cross-direction front side) hereafter, it allots for calling it a front side -- having -- the [ the above 1st and ] -- the bearing which can insert in the 2 pumping axes 11a and 11b -- with 1st side-attachment-wall section 21a in which the hole was formed Longitudinal direction other side of the periphery section of this 1st side-attachment-wall section 21a to the aforementioned pumping axes 11a and 11b (in the gestalt of this operation) it considers as the enclosed type which has peripheral-wall section 21b prolonged to be a vehicle cross-direction back side and call it a back side hereafter -- having -- \*\*\*\* -- the end face by the side of back -- the [ 1st hydraulic-pump 10a and ] -- the aforementioned opening 21c which can insert 2 hydraulic-pump 10b is formed and the aforementioned opening of this 1st pump case 21 -- the aforementioned pin center, large section 30 -- liquid -- it is blockaded densely

[0039] the bearing in which the 2nd aforementioned pump case 22 can insert the front side edge section of 1st pumping-axes 11a -- the [ a hole and ] -- it considers as the enclosed type which has peripheral-wall section 22b which extended in back from the periphery section of front side-attachment-wall 22a in which bearing which carries out bearing support of the front side edge section of 2 pumping-axes 11b was formed, and this front attachment-wall 22a, and opening 22c which can insert the aforementioned power transmission device 50 is formed in the end face by the side of back

[0040] this 2nd pump case 22 -- the aforementioned opening 22c -- 1st side-attachment-wall section 21a of the 1st aforementioned pump case 21 -- liquid -- it connects with the 1st aforementioned pump case 21, and the hold space of the aforementioned power transmission device 50 is formed in the bottom of having two incomes with 1st side-attachment-wall 21a of the 1st aforementioned pump case 21 so that it may be blockaded densely

[0041] The aforementioned pump case 20 is constituted as mentioned above, and is functioning as a bridge wall to which 1st side-attachment-wall section 21a of the 1st pump case 21 demarcates pump-case hold space in a hydraulic-pump hold room and a power-transmission-device hold room. Thus, by demarcating a hydraulic-pump hold room and a power-transmission-device hold room by the bridge wall, the foreign matters generated with the aforementioned power transmission device 50, such as iron powder, enter a hydraulic-pump hold room, and can prevent effectively damaging the piston units 12a and 12b and the cylinder blocks 13a and 13b. the [ furthermore, / the 1st which penetrates bridge-wall 21a, and ] -- if a seal ring and oil seal are installed in the periphery side of the 2 pumping axes 11a and 11b, irruption of the aforementioned foreign matter can be prevented certainly

[0042] in addition, the seal means by which the insertion fraction of each shafts 11a, 15a, and 15b in the aforementioned pump case 20 is proper -- liquid -- the seal is carried out densely and this pump case 20 can be used now as an oil tank

[0043] furthermore, the oil circulation which opens a hydraulic-pump hold room and a power-transmission-device hold room for free passage preferably to the aforementioned 1st side-attachment-wall section 21a which functions as a bridge wall as shown in drawing 5 -- a hole 23 -- forming -- this oil circulation -- VCF 24 which prevents mixing of a foreign matter etc. to a hole 23 can be formed Thus, without supplying separately the lubricating oil of 50 for power transmission devices, if the oil style through-hole 23 is formed, the lubrication of the power transmission device 50 can be carried out from reservoir oil in a pump case 20, and a low-cost-izing and maintenance disposition top can be planned.

[0044] Preferably, the aforementioned oil style through-hole 23 can sandwich the gearing point of 1st gearing 50a and 2nd gearing 50b, and can prepare it in each by the side of this gearing's hand-of-cut front, and back. Thus, by constituting, it is enabled to circulate through the reservoir oil between a hydraulic-pump hold room and a power-transmission-device hold room efficiently by the pump action by rotation of a gearing.

[0045] furthermore, the gestalt of this operation is shown in drawing 2 -- as -- the [ the above 1st and ], since the 2 movable cam plates 14a and 14b are considered as the cradle type If the piston units 12a and 12b in the aforementioned movable cam plates 14a and 14b form the concave radii sides 26a and 26b corresponding to the convex radii sides 16a and 16b of the side (tooth-back side) to estrange in the field which faces the hydraulic pumps 10a and 10b of the aforementioned bridge-wall 21a It can show around according to these concave radii sides 26a and 26b free [ sliding of the convex radii sides 16a and 16b of the movable cam plates 14a and 14b ], and positioning by which these movable cam plates 14a and 14b were stabilized can be performed.

[0046] In addition, in the gestalt of this operation, although 1st side-attachment-wall section 21a of the 1st

pump case 21 was used as a bridge wall, as long as the aforementioned operation is achieved, various gestalt is applicable [ it replaces with this, and ]. For example, it is also possible to constitute so that a pump case may be made into a simple single enclosed type and a bridge wall may be separately attached in the halfway fraction of the enclosed type of this \*\* 1.

[0047] Next, the pin center, large section 30 is explained. As well shown in the drawing 2 and the drawing 4, this pin center, large section 30 contacts the back end face of the aforementioned pump case 20, and is equipped with the 1st pin center, large section 31 connected with this pump case 20 so that the aforementioned opening 21c may be blockaded, and the 2nd pin center, large section 32 connected with this 1st pin center, large section 31 so that the charge pump 60 driven in operation by pumping-axes 11a in the aforementioned 1st hydraulic-pump 10a may be surrounded.

[0048] Into the aforementioned pin center, large section 30, as shown in drawing 3, the drawing 4, and the drawing 6 The 1st inhalation / regurgitation ways 33a and 33a of the couple in which the end section opens for free passage to each of the inhalation opening of the aforementioned 1st hydraulic-pump 10a, and a delivery, and the other end carries out opening to contact side 31a with the aforementioned pump case 20 in the aforementioned 1st pin center, large section 31, The 2nd inhalation / regurgitation ways 33b and 33b of the couple in which the end section opens for free passage to each of the inhalation opening of the aforementioned 2nd hydraulic-pump 10b, and a delivery, and the other end carries out opening to contact side 31a with the aforementioned pump case 20 in the aforementioned 1st pin center, large section 31, The 1st charge oilway 34 the end section is opened for free passage by the delivery of the aforementioned charge pump 60, and the other end carries out [ the oilway ] opening to contact side 31a with the aforementioned pump case 20 in the aforementioned 1st pin center, large section 31 is formed.

[0049] The 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple A part of 1st oil pressure lines 130a and 130a of the aforementioned couple which connects between the aforementioned 1st hydraulic-pump 10a and 1st hydraulic-motor 140a are constituted. On the other hand, the 2nd inhalation / regurgitation ways 33b and 33b of the aforementioned couple constitute a part of 2nd oil pressure lines 130b and 130b of the aforementioned couple which connects between the aforementioned 2nd hydraulic-pump 10b and 2nd hydraulic-motor 140b (refer to the drawing 1 ).

[0050] As shown in drawing 1, the pressure regulation line 35 which is open for free passage on the aforementioned 1st charge line 34 is formed in the aforementioned pin center, large section 30. The relief valve 61 which sets up the oil pressure of the 1st charge line 34 is inserted in this pressure regulation line 35. In the gestalt of this operation, as shown in the drawing 9 and the drawing 10, this relief valve is arranged in the 2nd pin center, large section 32.

[0051] Furthermore, the free passage way which makes the other end of the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple, and the 2nd inhalation / regurgitation ways 33b and 33b of the aforementioned couple and the other end of the aforementioned 1st charge oilway 34 open for free passage is formed in either [ at least ] the aforementioned pump case 20 or the pin center, large section 30.

[0052] In the gestalt of this operation, as well shown in the drawing 3 and the drawing 7, to contact side 21e with the 1st pin center, large section 31 in the 1st housing 21 The slot 36 which opens the other end of the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple, and the 2nd inhalation / regurgitation ways 33b and 33b of the aforementioned couple and the other end of the aforementioned 1st charge oilway 34 for free passage is formed, and this slot 36 constitutes the aforementioned free passage way.

[0053] And the check valves for charge 62a, 62b, 62c, and 62d which flowing of the oil to the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple, and the 2nd inhalation / regurgitation ways 33b and 33b of the aforementioned couple is permitted from the aforementioned 1st charge oilway 34, and the oil of an opposite direction flows, and are prevented As well shown in drawing 3, it has possible [ an installation ] from contact side 31a of the aforementioned 1st pin center, large section 31, or contact side 21e of the 1st aforementioned housing 21.

[0054] the [ thus, / contact side 21e with the 1st pin center, large section 31 in the check valve for charge 62, and the 1st housing 21, or ] -- the following effects can be acquired by making an installation possible from contact side 31a with the 1st housing 21 in 1 pin-center, large section 31

[0055] Namely, it becomes unnecessary to puncture the pin center, large section 30 the hole for the check-valve 62 installation for charge separately. Therefore, it is enabled to attain cheap-ization of a manufacturing cost by

making unnecessary machining which was the need conventionally.

[0056] Moreover, since the check valve for charge 62 is fixable, while it can make unnecessary the covering device material for this check-valve fixation etc. and cheap-ization of the cost by curtailment of parts mark can be attained only by connecting the 1st housing 21 and the 1st pin center, large section 31, enhancement in assembly luminous efficacy can be aimed at.

[0057] Furthermore, as shown in drawing 3, the drawing 7, and the drawing 10, leakage \*\*\*\*\* 37 which surrounds a way side outside the free passage way 36 of the shape of an aforementioned quirk, and was opened for free passage in the pump case is formed in contact side 21e with the aforementioned pin center, large section 30 in the aforementioned pump case 20.

[0058] \*\* or \*\* leakage \*\*\*\*\* 37 prevents effectively that the oil which flows into the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple, and the 2nd inhalation / regurgitation ways 33b and 33b of the aforementioned couple through the aforementioned free passage way 36 from the 1st charge oilway 34 leaks to the method of outside from the contact fraction between the 1st pump case 21 and the 1st pin center, large section 31. that is, it is \*\*\*\* from the aforementioned free passage way 36 -- the oil carried out will be caught by aforementioned leakage \*\*\*\*\* 37, it will be returned in a pump case 20, and, thereby, a leakage of the oil to the method of outside from the contact side between the 1st pump case 21 and the 1st pin center, large section 31 is prevented effectively

[0059] In addition, preferably, between [ one / at least ] the aforementioned 1st charge oilway 34, and the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple, it can reach and the leakage lines 63a and 63b equipped with the throttle valve can be formed between / one / at least ] the 1st charge oilway 34, and the 2nd inhalation / regurgitation ways 33b and 33b of the aforementioned couple (refer to the drawing 1).

[0060] These leakage lines 63a and 63b are for being stabilized and securing the neutral status of hydraulic pumps 10a and 10b. That is, if the movable cam plates 14a and 14b of hydraulic pumps 10a and 10b incline from a center valve position, a pressure differential will arise among the 1st oil pressure lines 130a and 130a of a couple, and/or among the 2nd oil pressure lines 130b and 130b of a couple, and hydraulic motors 120a and 120b will rotate by this. Therefore, when the center valve position of the aforementioned movable cam plates 14a and 14b has shifted from the setting position according to the manufacture error etc., hydraulic motors 120a and 120b will rotate against a user's mind. On the other hand, as mentioned above, if the leakage lines 63a and 63b are formed, a pressure oil will leak through these leakage lines 63a and 63b from 1st oil pressure line 130a of the aforementioned couple, or 2nd oil pressure line 130b of the aforementioned couple. Therefore, in spite of making it located in the center valve position on a design of the movable cam plates 14a and 14b Even if it is the case where a movable cam plate inclines for a while according to a manufacture error etc. The pressure differential produced among the 1st oil pressure lines 130a and 130a of a couple and/or among the 2nd oil pressure lines 130b and 130b of a couple can be stopped effectively, a neutral domain can be secured widely, and the rotation contrary to the mind of hydraulic motors 120a and 120b can be prevented effectively.

[0061] In addition, a leakage of the pressure oil from the oil pressure lines 130a and 130b of the couple by the leakage lines 63a and 63b From the point of the efficiency of transmission between hydraulic pumps 10a and 10b and the hydraulic motors 120a and 120b, since it is not desirable, this leakage line It can prepare between the oilways of the 1st charge oilway 33, and the 1st inhalation / regurgitation ways 33a and 33a of a couple which reach on the other hand and serve as [ between / one / the 2nd inhalation / regurgitation ways 33b and 33b of a couple ] the hyperbaric pressure more preferably at the time of vehicle go-astern among the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple. This is because many [ rather than the direction which advances a vehicle reverses a vehicle ].

[0062] Furthermore, as shown in the drawing 1 and the drawing 6, inhalation / regurgitation way 33a of the aforementioned couple, 1st bypass oilway 38a which opens between 33a for free passage and the 2nd inhalation / regurgitation way 33b of the aforementioned couple, and 2nd bypass oilway 38b which opens between 33b for free passage are formed in the 1st pin center, large section 31. In addition, although 1st bypass oilway 38a is explained to below, this explanation is applied also about 2nd bypass oilway 38b. In the gestalt of this operation, as well shown in drawing 6, the 1st inhalation / regurgitation ways 33a and 33a of a couple are drilled in parallel mutually, and the aforementioned 1st bypass oilway 38a is formed in the orientation which intersects perpendicularly with the 1st inhalation / regurgitation way of this couple. Thus, between the 1st inhalation / regurgitation way 33a of a couple, and 33a is made to open for free passage only by drilling one

hole by constituting.

[0063] The aforementioned 1st bypass oilway 38a is equipped with 1st bypass valve 40a which might be taken in the free passage position which makes between the 1st inhalation / regurgitation way 33a of the aforementioned couple, and 33a the free passage status, and the cutoff position which makes between both oilways a cut off state. As shown in drawing 6, this 1st bypass valve 40a has base edge 41a which extended in the way outside the 1st pin center, large section 31, and can take the aforementioned free passage position and a cutoff position by operation from a way outside this 1st pin center, large section 31.

[0064] Specifically the aforementioned 1st bypass oilway 38a Inner screw section 39a which a base edge opens to the exterior of the 1st pin center, large section and by which the inner screw was formed in inner skin, Pars-intermedia 39b which it is further prolonged in the inner direction from the nose of cam of this screw section, and the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple approach, while was formed so that it might straddle. It has point 39c of a minor diameter from the pars intermedia opened for free passage by another side of the 1st inhalation / regurgitation ways 33a and 33a of the aforementioned couple with the step from the nose of cam of this pars intermedia.

[0065] Base edge 41a to which the aforementioned 1st bypass valve 40a is located in a way outside the 1st pin center, large section on the other hand, It is prolonged from this base edge to them, is prolonged from this \*\* screw section to them with outside screw section 41b in which the outside screw screwed with screw section 39a within the above was formed, and sets to base one end from either the 1st inhalation or the regurgitation ways 33a and 33a of the aforementioned couple. the aforementioned pars-intermedia 39b and liquid -- it is prolonged from this seal section to them with seal section 41c engaged densely, and has 41d of the contact sections formed so that it might counter with the aforementioned step Therefore, this 1st bypass valve 40a can take now the cutoff position where the 41d of the aforementioned contact sections contacts a step, and the free passage position which the 41d of the aforementioned contact sections estranged from the step by rotating the aforementioned 1st bypass valve 40a to the circumference of an axis through the aforementioned machine edge 41a.

[0066] the [ \*\*, \*\*\*\* 1 bypass oilway 38a, and ] -- the [ 1 bypass-valve 40a and ] -- the [ 2 bypass oilway 38b and ] -- an open means to have 2 bypass-valve 40b is a thing for moving a vehicle easily, when there is the need of moving a vehicle compulsorily by human power etc. in the time of failure of a driving source 100 and the hydraulic pumps 10a and 10b etc. (a wheel being rotated compulsorily) Namely, if the wheel with which hydraulic motors 120a and 120b were connected after the 1st oil pressure lines 130a and 130a of a couple and/or the 2nd oil pressure lines 130b and 130b of a couple had closed is rotated compulsorily By rotation of these hydraulic motors 120a and 120b, a pressure differential arises between 1st oil pressure line 130a of a couple, and 130a, and between 2nd oil pressure line 130b of a couple, and 130b, and it becomes difficult to move a vehicle (for a wheel to be rotated). On the other hand, since between 1st oil pressure line 130a of the aforementioned couple and 130a and between 2nd oil pressure line 130b of a couple and 130b can be made to open for free passage if the aforementioned open means is established, without making all the check valves 62a-62d open wide mechanically compulsorily, it is enabled to perform a compulsory move of a vehicle easily.

[0067] Furthermore, in the gestalt of this operation, as shown in drawing 6, all of the connection port of the 1st inhalation / regurgitation ways 33a and 33a of a couple, and the 2nd inhalation / regurgitation ways 33b and 33b of a couple are formed in the same side face of the 1st pin center, large section 31, and this is attaining easy-ization of the piping connection work between hydraulic motors 120a and 120b.

[0068] Furthermore, as shown in the drawing 1 and the drawing 4, the 2nd charge oilway 42 by which it reaches 1st pin center, large section 31, and the end section is open for free passage inside a pump case 20 into the 2nd pin center, large section 32, and the other end was opened for free passage by the 1st charge oilway 34 is formed. When the oils in oil pressure line 130a of the aforementioned couple and 130b decrease in number, preventing an inflow of the oil to a pump case 20 from the 1st charge oilway 34, this 2nd charge oilway 42 is constituted so that an oil can be supplied to the oil pressure lines 130a and 130b from a pump case 20.

[0069] In the gestalt of this operation, permitting an inflow of the oil to the 1st charge oilway 34 from a pump case 20 in the 2nd charge oilway 42, it has the check valve 43 which prevents an inflow of the oil of the reverse sense, and this has obtained the aforementioned operation. In addition, although it is worsening the luminous efficacy of the charge pump 60 a little, it is also possible to replace with the aforementioned check valve 43 and to have a throttle valve.

[0070] By having \*\* or the \*\*\*\*\* 2 charge oilway 42, in the time of stoppage on a slope etc., a vehicle can advance below against mind, and the freewheel phenomenon produced when a wheel rotates can be prevented effectively. That is, usually let the cam plate of hydraulic pumps 10a and 10b be a center valve position at the time of vehicle stoppage. It is in this status, for example, when having stopped at the slope etc., the force which causes rotation of a wheel acts on this vehicle with a self-weight of a vehicle. That is, the force which is going to cause rotation of the motor shaft of hydraulic motors 120a and 120b acts on a vehicle. As mentioned above, since hydraulic pumps 10a and 10b are made into the neutral status, by \*\* or \*\*\*\*\* of hydraulic motors 120a and 120b, on the other hand, the oil pressure lines 130a and 130a of a couple reach, one side of the oil pressure lines 130b and 130b of a couple serves as the hyperbaric pressure, and another side serves as low voltage. If the oil pressure of an oil pressure line becomes beyond a predetermined value, an oil will begin to leak from openings, such as a cylinder block of the hydraulic pump currently opened for free passage by the oil pressure line used as this hyperbaric pressure. Thereby, the oil quantity in the oil pressure line of a couple decreases, and it becomes easy to rotate a motor shaft freely.

[0071] On the other hand, in the gestalt of this operation, since it has the aforementioned 2nd charge oilway 42, when the oil quantity of the oil pressure lines 130a and 130a (and 130b, 130b) of a couple decreases and this oil pressure line serves as negative pressure, the reservoir oil in a pump case will be absorbed by this oil pressure line. That is, an oil-quantity decrement of the oil pressure line of the aforementioned couple is prevented, and free rotation of a motor shaft can be prevented effectively.

[0072] As shown in drawing 2, the drawing 5, the drawing 8, and the drawing 9, VCF 160 is formed behind the 2nd pin center, large section 32. the [ and ] -- into 2 pin-center, large section 32 with the inhalation line 65 with which the end section is open for free passage to the inhalation opening of the charge pump 60, and the other end was opened for free passage by the VCF The VCF line 66 with which the end section was opened for free passage by VCF 160 and the other end was opened for free passage by the oil tank (not shown) is formed, and the oil from an oil tank minds an oilway 67, VCF 160, and the VCF line 66. It draws in to the inhalation opening of the charge pump 60.

[0073] moreover, the pump unit 1 concerning the gestalt of this operation -- the [ the above 1st and ] -- the 2 hydraulic pumps 10a and 10b, the aforementioned pin center, large section 30, and the aforementioned housing 20 are connected in one, and constitute the single unit therefore, only attaching unit 1a of this \*\* 1 in a vehicle - the [ 1st hydraulic-pump 10a and ] -- since the both sides of 2 hydraulic-pump 10b can be installed in a vehicle, the assembly-operation luminous efficacy of a vehicle can also be raised

[0074] It explains below gestalt 2. of operation, referring to drawing 12 about the gestalt of desirable operation of the 2nd of the pump unit concerning this invention. Drawing 12 is a vertical section side elevation of 1st pin center, large section 31' in pump-unit 1' concerning the gestalt of this operation, and is drawing equivalent to the drawing 6 in the gestalt 1 of the aforementioned implementation.

[0075] the gestalt of this operation -- the gestalt 1 of the aforementioned implementation -- setting -- the [ 1st bypass-line 38a and ] -- it replaces with 2 bypass-line 38b, and the single common bypass line 38 is formed In addition, in the following explanations, also in the gestalt 1 of the aforementioned implementation, a dash is given to the same member or a considerable member at the same sign or the same sign, and the explanation is omitted.

[0076] A base edge carries out opening of this common bypass-line 38' to the method of outside, and the point is opened for free passage by all of the 1st inhalation / regurgitation ways of a couple, and the 2nd inhalation / regurgitation ways 33b and 33b of a couple.

[0077] And this common bypass-line 38' is equipped with single bypass valve 40' made operational from the way outside 1st pin center, large section 31' in the free passage/cutoff between the 1st inhalation / regurgitation way 33a of the aforementioned couple, and 33a, and between the 2nd inhalation / regurgitation way 33b of the aforementioned couple, and 33b.

[0078] In addition to the effect in the gestalt 1 of the aforementioned implementation, in the gestalt 2 of \*\* or \*\*\*\*\* , cheap-ization of the cost by the increase in efficiency of punch work and curtailment of parts mark can be attained.

[0079] In addition, in the gestalt of each aforementioned implementation, although the case where it had the hydraulic pump of a couple was explained to the example, this invention is not restricted to \*\* or \*\*\*\*\* , and when it has the case where it has a single hydraulic pump, and three or more hydraulic pumps, it can be applied.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

## [Brief Description of the Drawings]

[Drawing 1] Drawing 1 is a hydraulic-circuit view of the vehicle with which the gestalt of the 1st operation was applied where the pump unit concerning this invention is desirable.

[Drawing 2] Drawing 2 is a transection plan of the pump unit concerning the gestalt of the 1st operation.

[Drawing 3] a part of pump unit which drawing 3 requires for the gestalt of the 1st operation -- it is a solution perspective diagram

[Drawing 4] Drawing 4 is an A-A line cross section in drawing 2 .

[Drawing 5] Drawing 5 is a B-B line cross section in drawing 2 .

[Drawing 6] Drawing 6 is a C-C line cross section in drawing 2 .

[Drawing 7] Drawing 7 is D-D-lines cross section in drawing 2 .

[Drawing 8] Drawing 8 is E-E-lines cross section in drawing 2 .

[Drawing 9] Drawing 9 is F-F line cross section in drawing 2 .

[Drawing 10] Drawing 10 is G-G string cross section in drawing 5 .

[Drawing 11] Drawing 11 is a plan of the pump unit concerning the gestalt of the 1st operation.

[Drawing 12] Drawing 12 is drawing of longitudinal section of the 1st pin center, large section in the gestalt of the 2nd operation with the desirable pump unit concerning this invention.

## [Description of Notations]

## 1 Pump Unit

10a, 10b The 1st hydraulic pump, the 2nd hydraulic pump

## 20 Pump Case

21e The contact side with the pin center, large section in a pump case

## 30 Pin Center, large Section

31a The contact side with the pump case in a pin center, large section

33a, 33b The 1st inhalation / regurgitation way of a couple, the 2nd inhalation / regurgitation way of a couple

## 34 1st Charge Oilway

## 36 Free Passage Way

## 37 \*\*\*\*\* for Leakage

38a, 38b The 1st bypass way, the 2nd bypass way

40a, 40b Opening-and-closing valve

## 42 2nd Charge Oilway

## 60 Charge Pump

## 62 Check Valve for Charge

[Translation done.]

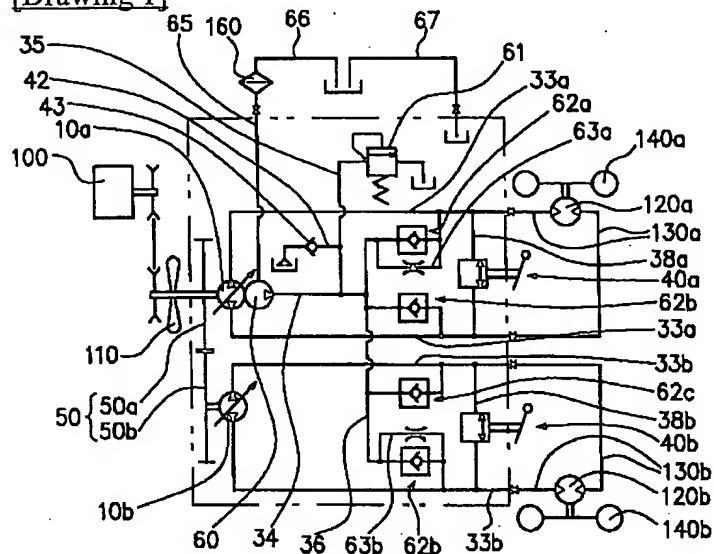
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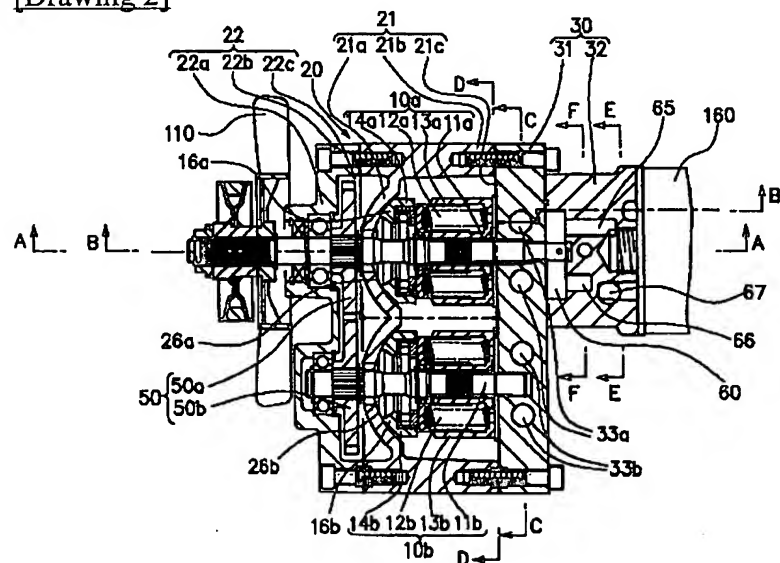
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## DRAWINGS

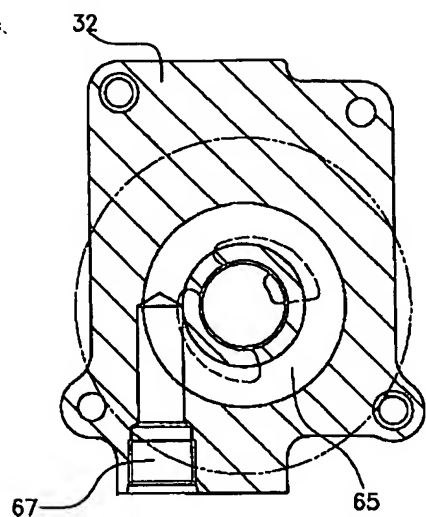
[Drawing 1]



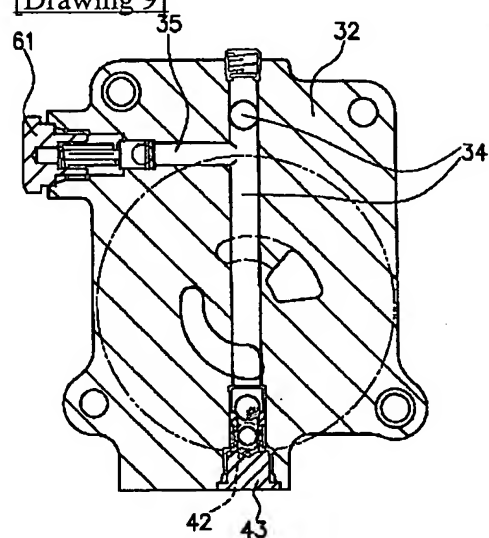
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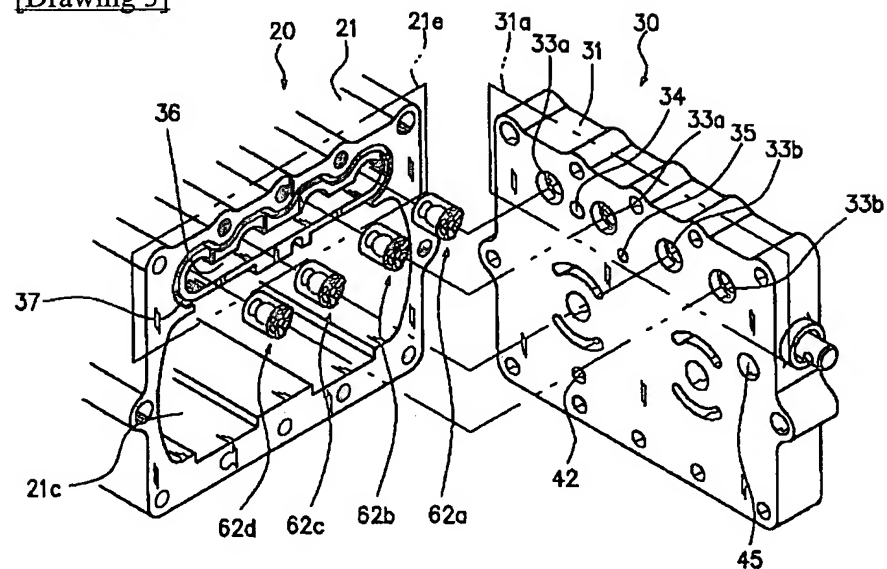
[Drawing 8]



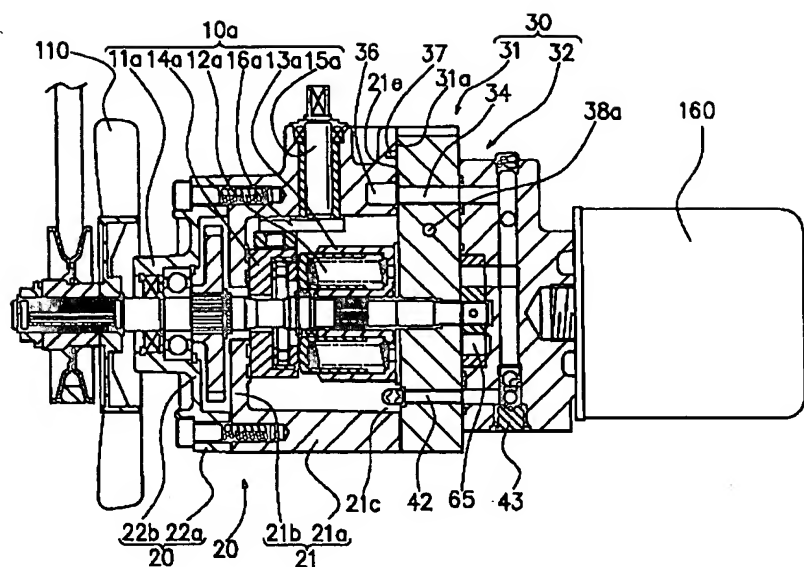
[Drawing 9]



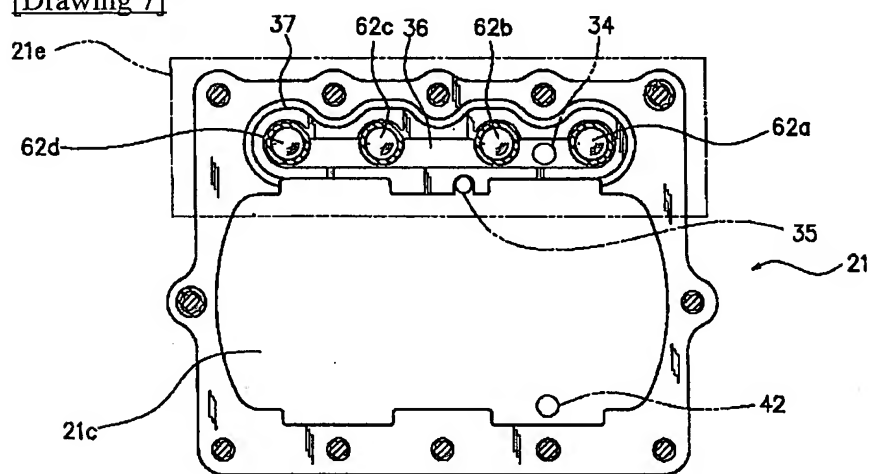
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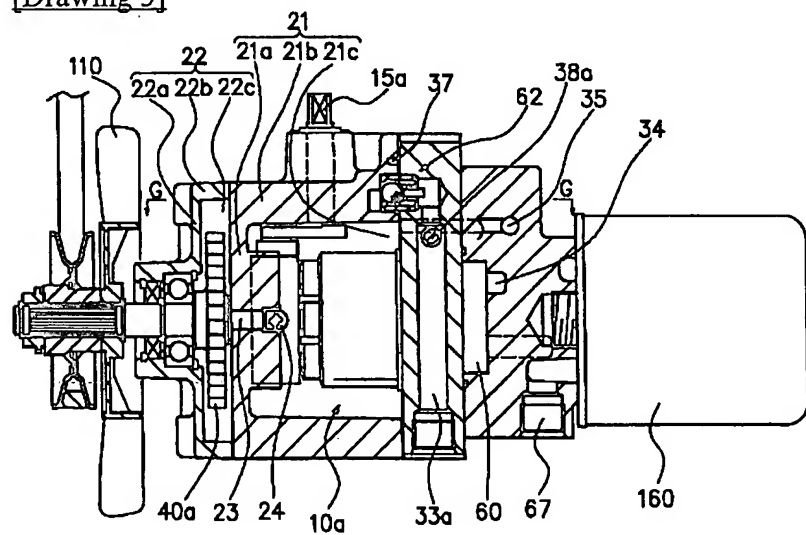
[Drawing 4]



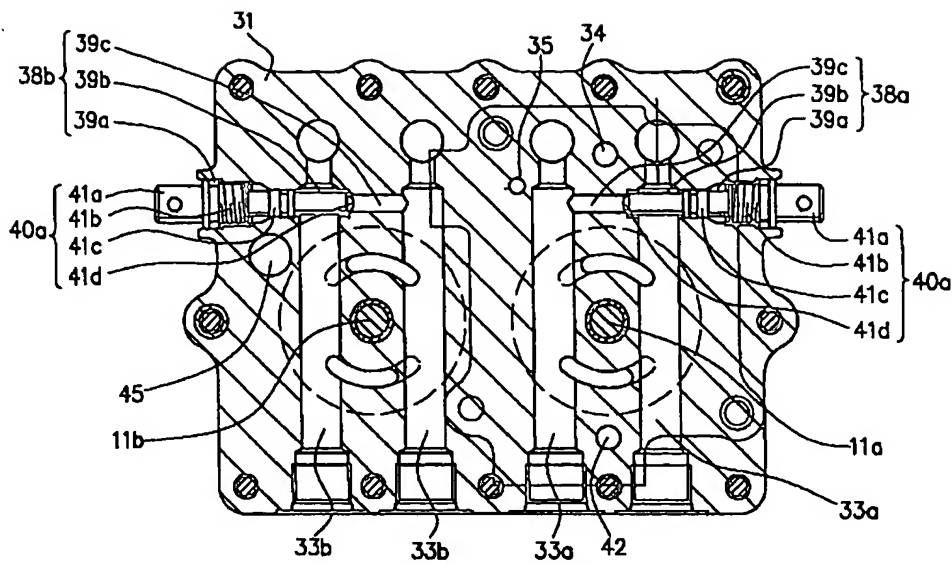
[Drawing 7]



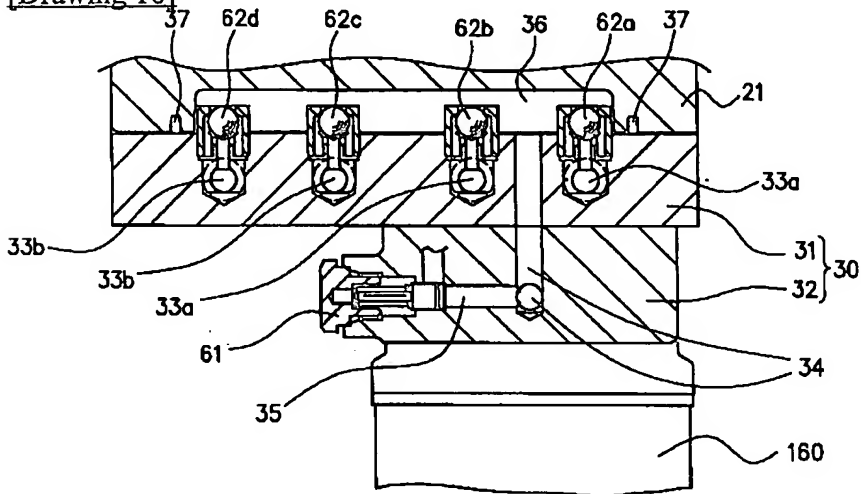
[Drawing 5]



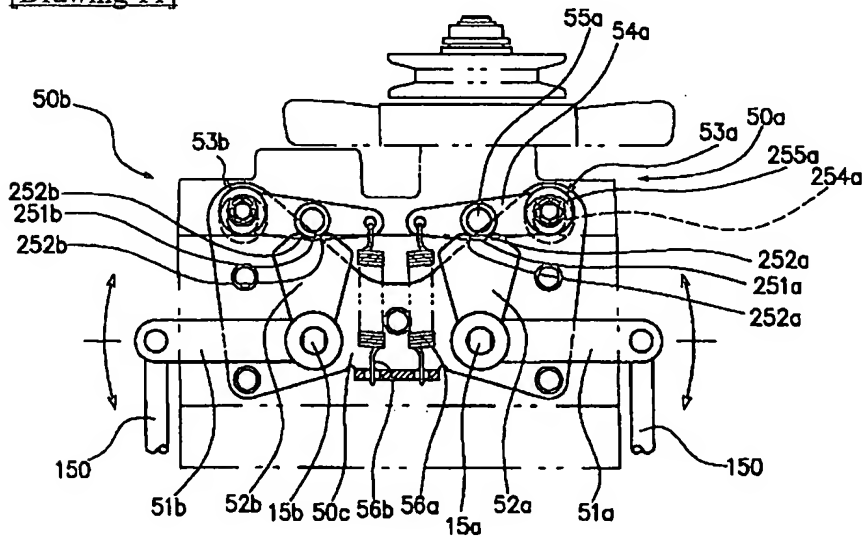
[Drawing 6]



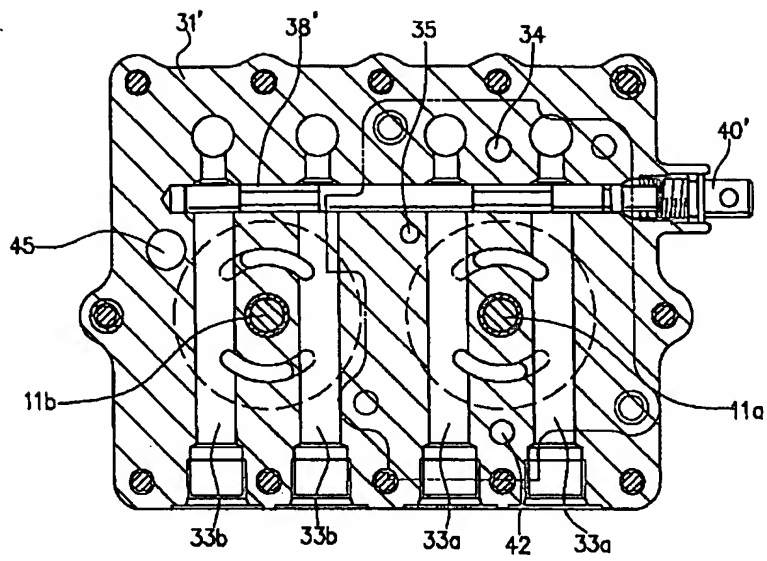
[Drawing 10]



[Drawing 11]



[Drawing 12]



[Translation done.]